Vitrinite reflectance data and analysis of the interval 1,000 to 11,230 feet for the Alaska Consolidated Oil Iniskin Unit Zappa No. 1 well.

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VITRINITE REFLECTANCE ANALYSIS OF THE INTERVAL 1000-11,230FT, INSKIN WELL, ALASKA

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CALGARY, ALBERTA

VITRINITE REFLECTANCE ANALYSIS OF THE INTERVAL 1000-11,230FT INSKIN WELL, ALASKA

Introduction

This report describes the vitrinite reflectance analysis of 21 cuttings samples from the INSKIN oil exploration well.

Fifty vitrinite reflectance measurements for each sample are taken wherever possible utilizing a Zeiss 01K photometer attachment mounted on a Zeiss Photoscope 1. Each measurement is qualified as to poor (P), good (G) or excellent (E), depending upon such factors as: particle size, pitting, scratching or the proximity to pyritic particles. The measurements of particles interpreted to be reworked vitrinite are labeled with an "R" while the measurements of particles interpreted to be caved material are labeled with a "C". A table and a plot of all measurements displayed as a histogram for each sample are given in Appendix A.

A vitrinite reflectance log is included which displays each histogram at the level of the sample. The material considered as caved is cross-hatched in blue while the material considered to be reworked is cross-hatched in red. The good and excellent samples are coloured in solid green while the poor measurements are coloured in cross-hatched green. Further colour copies of this log are available through the Bujak Davies Group.

The laboratory procedures for the mounting and polishing of the vitrinite samples follows the methodology described by Davies and Avery (1984) in a triple mount stub with standard 600 grit, .3 micron and .05 micron polishing procedure on Buehler Automet polishing equipment. This methodology results in a polished mount of unoxidized kerogen.

The levels of vitrinite reflectance are compared to the Thermal Alteration Index (TAI) of Bujak, Barss & Williams (1977a,b) in Table 1 and are subdivided into various levels of thermal maturation for the generation of liquid and gaseous hydrocarbons. This generation model will vary from basin to basin depending upon the geohistory and kerogen compositions.

VITRINITE REFLECTANCE SUMMARY

Maturity Zones based on Ro

1000- 1450ft	Onset of Maturation
2010- 7470ft	Marginally Mature
7970-11,230ft	Peak of Maturity

Onset of Maturation Zone: 1000-1450ft

The onset of maturation is considered to coincide with the 1000ft and 1450ft samples. However, recovery in these two samples was poor, therefore the reflectance values should not be heavily relied upon.

Marginally Mature Zone: 2010-7470ft

The 2010ft sample is already well within the zone of marginal maturity; Ro = 0.760, with a good distribution of values. This zone may occur higher up in the well, but samples are not available to determine this. The vitrinite reflectance generally increases with depth within this zone. The 5440 and 5970ft samples both contain a large number of readings (Ro = 0.740 and 0.773, respectively) and can be considered reliable values. Other samples with fewer Ro values have either low recovery, or very small particles and occasional pyrite.

Peak of Maturity Zone: 7970-11,230ft

The 7970ft sample has an average Ro = 0.830 with 12 readings. The 8370ft sample (Ro = 0.808) has a larger number of values and verifies

that these samples are within the peak of maturity zone. The 10,790ft sample has slightly lower Ro values relative to other readings within the zone.

SAMPLE REMARKS FOR INSKIN WELL

1000-1030ft:	Very little kerogen recovery
1450-1480ft:	Very little kerogen recovery
2010-2040ft:	Very small particles, occasional pyrite
2370-2400ft:	Abundant pyrite, small particles
3040-3070ft:	Abundant pyrite, small particles
3400-3430ft:	No comment
4200-4230ft:	Small particles, occasional pyrite
4370-4390ft:	Small particles, occasional pyrite
5000-5030ft:	No comment
5440-5470ft:	Fine particle size
5970-6000ft:	Reliable values
6540-6570ft:	No comment
7120-7150ft:	Sparse grains, small particles, occasional pyrite
7440-7470ft:	Sparse grains, small particles, occasional pyrite
7970-8000ft:	Sparse grains, small particles, occasional pyrite

8370-8400ft:	Small particles, occasional pyrite
9000-9030ft:	Small particles, abundant pyrite
9530-9560ft:	Small particles, little samples, occasional pyrite, little vitrinite recovery
10,090-10,120ft:	Little kerogen recovery
10,370-10,400ft:	Little kerogen recovery, occasional pyrite
10,790-10,830ft:	Little kerogen recovery, abundant pyrite
11,110-11,140ft:	Very little kerogen recovery
11,190-11,230ft:	Very little kerogen recovery, occasional pyrite

REFERENCE

BUJAK, J.P., BARSS, M.S. & WILLIAMS, G.L.
1977 Offshore eastern Canada Part I. Offshore east Canada's organic type and colour and hydrocarbon potential. Oil and Gas Journal, vol. 75, pp. 198-202.

BUJAK, J.P., BARSS, M.S. & WILLIAMS, G.L.
1977 Offshore eastern Canada Part II. Offshore east Canada's organic type and color and hydrocarbon potential. Oil and Gas Journal, vol. 75, pp. 96-100.

DAVIES, E.H. & AVERY, M.P.
1984 A system for vitrinite reflectance analysis on dispersed organic matter for offshore eastern Canada. In: Current Research, Part A, Geological Survey of Canada, Paper 84-114, pp. 367-372.

TABLE 1: TAI & Ro%

TAI	Spore colour	Approx. Ro equiv.	Amorphous kerogen	Herbaceous-woody kerogen
1	Green/Yellow		Immature	Immature
1+	Yellow	0.35%	Immature	Immature
2-	Yellow/orange	0.45%	Immature	Immature
2-to2	Orange	0.50%	Onset of maturity	Immature
2	Orange/brown	0.60%	Marginally mature	Immature
2to2+	Brown/orange	0.70%	Marginally mature	Onset of maturity
2+	Light brown	0.9%	Peak maturity	Onset of maturity
2+to3-	L.Brown/brown	1.0%	Highly mature	Peak maturity
3-	Brown	1.1%	Highly mature	Peak maturity
3-to3	Med. brown	1.2%	Highly mature	Peak maturity
3	Brown/dr.brown	1.5%	Overmature	Peak maturity
3+	Dark brown	2.0%	Overmature	Highly mature
4-	Black	2.5%	Overmature	Highly mature
4	Black/corroded	4.0%	Overmature	Overmature

Table 1: Comparison of Vitrinite Reflectance (Ro%) and the Thermal Alteration Index scale (TAI) of Bujak, Barss & Williams (1977a,b).

APPENDIX A

Vitrinite Reflectance Measurements and Histograms

VITRINITE Proofing copy of FILE: INSKIN

HEADER:

Client: M.M.S. Scientist: DUMCIUS
Well: Inskin Well Date: January 1988
Area: Alaska Samples are: F

VITRINITE DATA:

Sample Depth : 1000.0

0.400 C 0.430 C 0.490 0.530 0.560 0.600

Actual Mean = 0.502 Actual Standard Deviation = 0.077

Edited Mean = 0.545 Edited Standard Deviation = 0.047

Sample Depth : 1450.0

0.580

Actual Mean = 0.580 Actual Standard Deviation = 0.000

Edited Mean = 0.580 Edited Standard Deviation = 0.000

Sample Depth : 2010.0

0.430	C	0.610	0.650	0.700		0.700		0.730		0.760		
0.760		0.760	0.770	0.770		0.800		0.810		0.830		
0.830		0.840	0.840	0.900	R	0.950	R	0.970	R	0.970	R	

Actual Mean = 0.780 Actual Standard Deviation = 0.125

Edited Mean = 0.760 Edited Standard Deviation = 0.068

Sample Depth : 2370.0

0.650 0.730 0.780 0.780 0.780

Actual Mean = 0.744 Actual Standard Deviation = 0.057

Edited Mean = 0.744 Edited Standard Deviation = 0.057

Sample Depth : 3040.0

0.640 0.760 0.840 0.880 0.880

Actual Mean = 0.800 Actual Standard Deviation = 0.102

Edited Mean = 0.800 Edited Standard Deviation = 0.102

Sample Depth : 3400.0

0.650 0.660 0.670 0.780 0.810 0.820 0.820
0.850 0.870 0.880

Actual Mean = 0.781 Actual Standard Deviation = 0.089

Edited Mean = 0.781 Edited Standard Deviation = 0.089

Sample Depth : 4200.0

0.540 C 0.570 C 0.580 C 0.600 0.600 0.610 0.640
0.730 0.740 0.740 0.830

Actual Mean = 0.653 Actual Standard Deviation = 0.092

Edited Mean = 0.686 Edited Standard Deviation = 0.086

Sample Depth : 4370.0

0.560 C 0.640 0.700 0.740 0.790 P 0.860

Actual Mean = 0.715 Actual Standard Deviation = 0.107

Edited Mean = 0.746 Edited Standard Deviation = 0.084

Sample Depth : 5000.0

0.620	0.660	0.680	0.710	0.720	0.750	0.780
0.820	0.830	0.840				

Actual Mean = 0.741 Actual Standard Deviation = 0.076

Edited Mean = 0.741 Edited Standard Deviation = 0.076

Sample Depth : 5440.0

0.520 C	0.550 C	0.600	0.610	0.620	0.640	0.640
0.650	0.660	0.660	0.670	0.680	0.690	0.710
0.710	0.710	0.730	0.730	0.750	0.750	0.760
0.760	0.770	0.780	0.780	0.780	0.790	0.800
0.810	0.820	0.850	0.860	0.860	0.890	0.890

Actual Mean = 0.728 Actual Standard Deviation = 0.093

Edited Mean = 0.740 Edited Standard Deviation = 0.082

Sample Depth : 5970.0

0.620	0.630	0.640	0.660	0.690	0.700	0.700
0.700	0.710	0.710	0.710	0.720	0.720	0.740
0.760	0.770	0.780	0.780	0.780	0.800	0.800
0.830 E	0.830	0.840	0.870	0.880	0.910	0.910
0.920	0.930	0.930	0.950 R	0.950 R	0.960 R	

Actual Mean = 0.789 Actual Standard Deviation = 0.102

Edited Mean = 0.773 Edited Standard Deviation = 0.093

Sample Depth : 6540.0

0.620	0.630	0.670	0.700	0.720	0.720	0.750
0.760	0.790	0.860	0.900	0.900		

Actual Mean = 0.752 Actual Standard Deviation = 0.096

Edited Mean = 0.752 Edited Standard Deviation = 0.096

Sample Depth : 7120.0

0.530	C	0.660		0.680		0.760		0.790		0.830		0.900	
0.930		1.020	R	1.020	R						

Actual Mean = 0.812 Actual Standard Deviation = 0.160

Edited Mean = 0.793 Edited Standard Deviation = 0.103

Sample Depth : 7440.0

0.610	C	0.620	C	0.640	C	0.650		0.650		0.690		0.700	
0.700		0.700		0.710		0.720		0.750		0.750		0.760	
0.760		0.760		0.760		0.780		0.780		0.800		0.810	
0.830		0.900		0.960	R	0.960	R	0.970	R	0.970	R	0.970	R
0.990	R	1.050	R	1.060	R						

Actual Mean = 0.799 Actual Standard Deviation = 0.132

Edited Mean = 0.748 Edited Standard Deviation = 0.061

Sample Depth : 7970.0

0.620	C	0.750		0.770		0.800		0.800		0.820		0.860	
0.860		0.870		0.880		0.890		1.030	R				

Actual Mean = 0.829 Actual Standard Deviation = 0.098

Edited Mean = 0.830 Edited Standard Deviation = 0.049

Sample Depth : 8370.0

0.610	C	0.710		0.720		0.730		0.760		0.760		0.760	
0.780		0.800		0.810		0.830		0.840		0.840		0.860	
0.880		0.920		0.920		0.950	R	1.000	R	1.010	R	1.080	R

Actual Mean = 0.837 Actual Standard Deviation = 0.114

Edited Mean = 0.808 Edited Standard Deviation = 0.067

Sample Depth : 9000.0

0.670	C	0.720		0.740		0.740		0.760		0.760		0.770
0.780		0.800		0.810		0.840		0.840		0.880		0.960
0.990	R	1.070	R	1.090	R							

Actual Mean = 0.836 Actual Standard Deviation = 0.123

Edited Mean = 0.800 Edited Standard Deviation = 0.067

Sample Depth : 9530.0

0.740		0.750		0.770		0.790		0.840		0.910		0.920
1.000	R	1.000	R	1.040	R							

Actual Mean = 0.876 Actual Standard Deviation = 0.113

Edited Mean = 0.817 Edited Standard Deviation = 0.074

Sample Depth : 10090.0

0.700	C	0.730	C	0.780		0.810		0.830		0.830		0.850
0.870		0.880		0.900		0.910		0.920		0.950		0.950
1.040	R											

Actual Mean = 0.863 Actual Standard Deviation = 0.089

Edited Mean = 0.873 Edited Standard Deviation = 0.055

Sample Depth : 10370.0

0.910		0.930		1.020		1.030		1.150	R	1.220	R	

Actual Mean = 1.043 Actual Standard Deviation = 0.122

Edited Mean = 0.973 Edited Standard Deviation = 0.061

Sample Depth : 10790.0

0.530	C	0.710	0.740	0.740	0.740	0.750		0.750
0.810		0.840	0.840					

Actual Mean = 0.745 Actual Standard Deviation = 0.088

Edited Mean = 0.769 Edited Standard Deviation = 0.048

Sample Depth : 11110.0

0.640	C	0.710	C	0.840	0.900	0.940	1.060	R

Actual Mean = 0.848 Actual Standard Deviation = 0.154

Edited Mean = 0.893 Edited Standard Deviation = 0.050

Sample Depth : 11190.0

0.730	C	0.800	0.840	

Actual Mean = 0.790 Actual Standard Deviation = 0.056

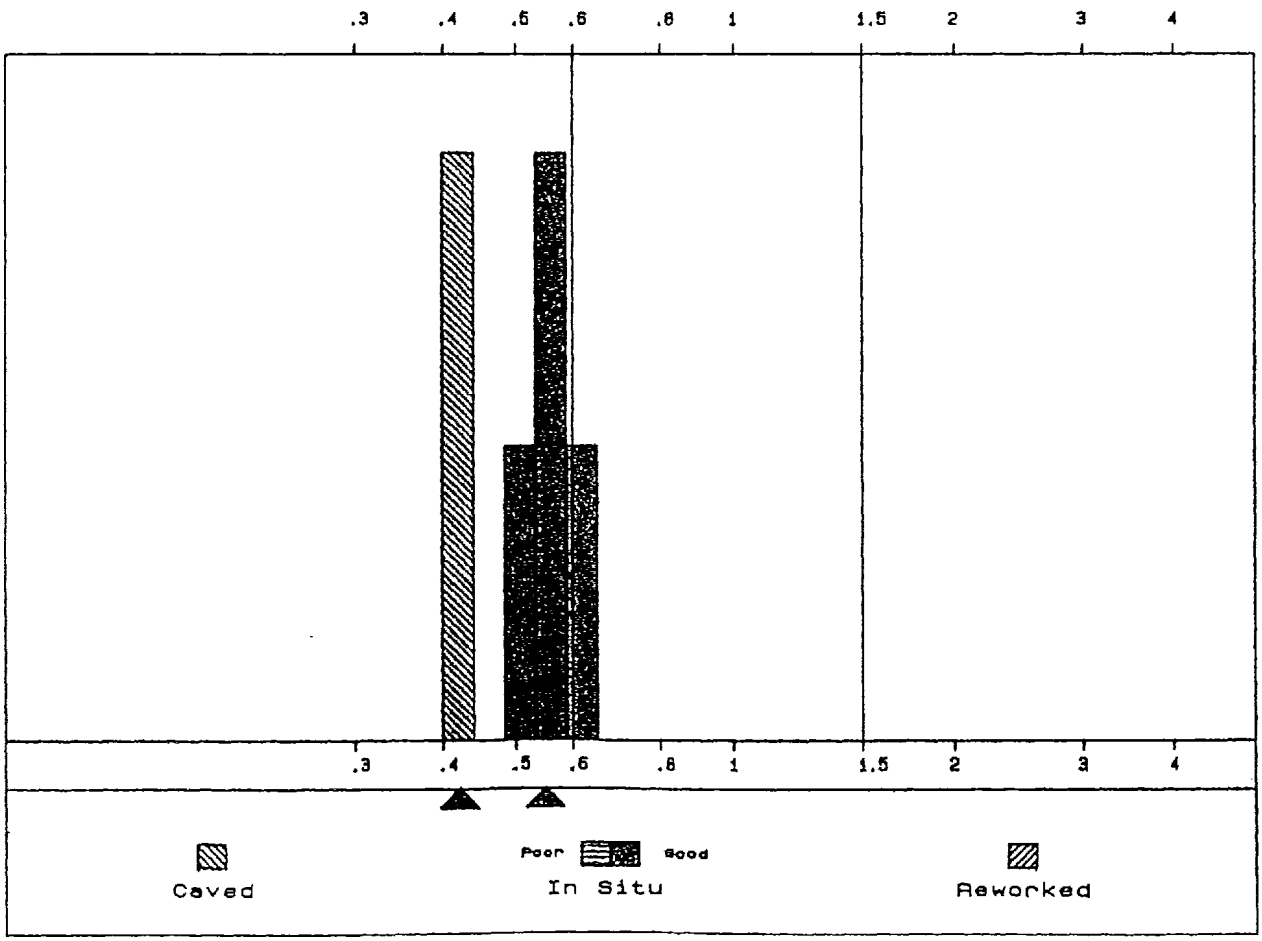
Edited Mean = 0.820 Edited Standard Deviation = 0.028

BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 1000f

Population	Mean	Standard Deviation
In Situ	0.55	0.05
Caved	0.42	0.02
Reworked	-	-
Total	0.50	0.08

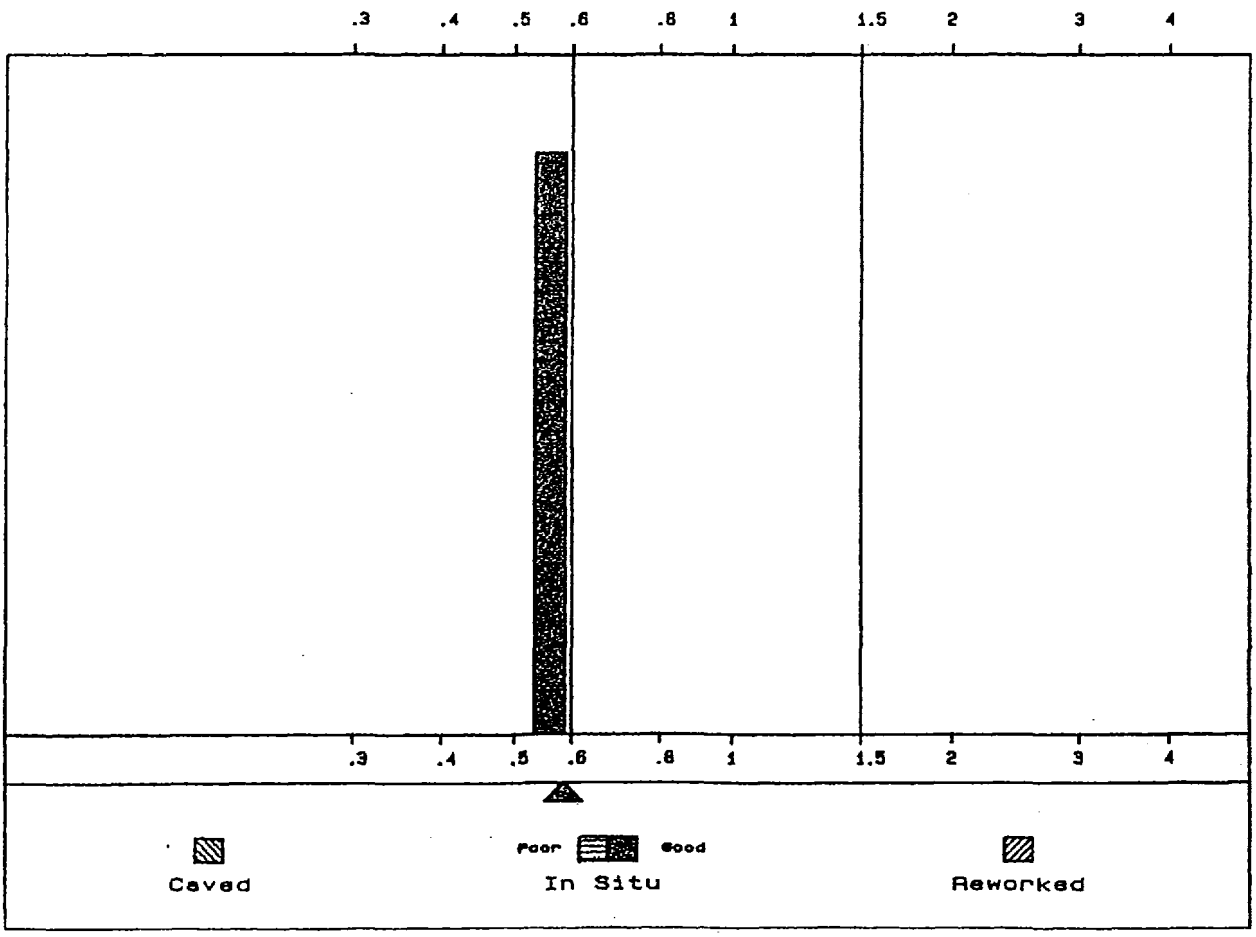
Total measurements this sample : 6



SAMPLE : 1450f

Population	Mean	Standard Deviation
In Situ	0.58	-
Caved	-	-
Reworked	-	-
Total	0.58	-

Total measurements this sample : 1

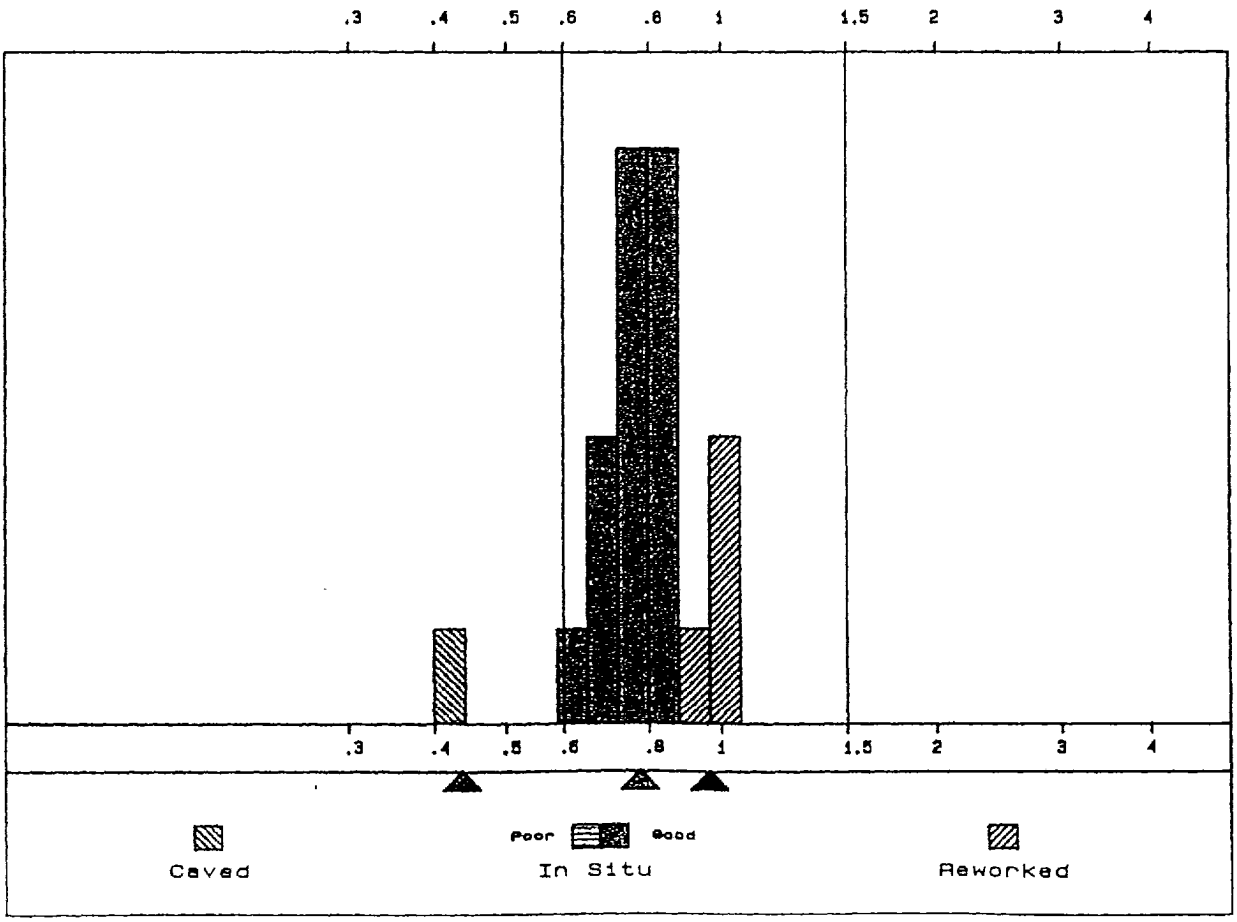


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 2010f

Population	Mean	Standard Deviation
In Situ	0.78	0.07
Caved	0.43	-
Reworked	0.95	0.03
Total	0.78	0.13

Total measurements this sample : 21

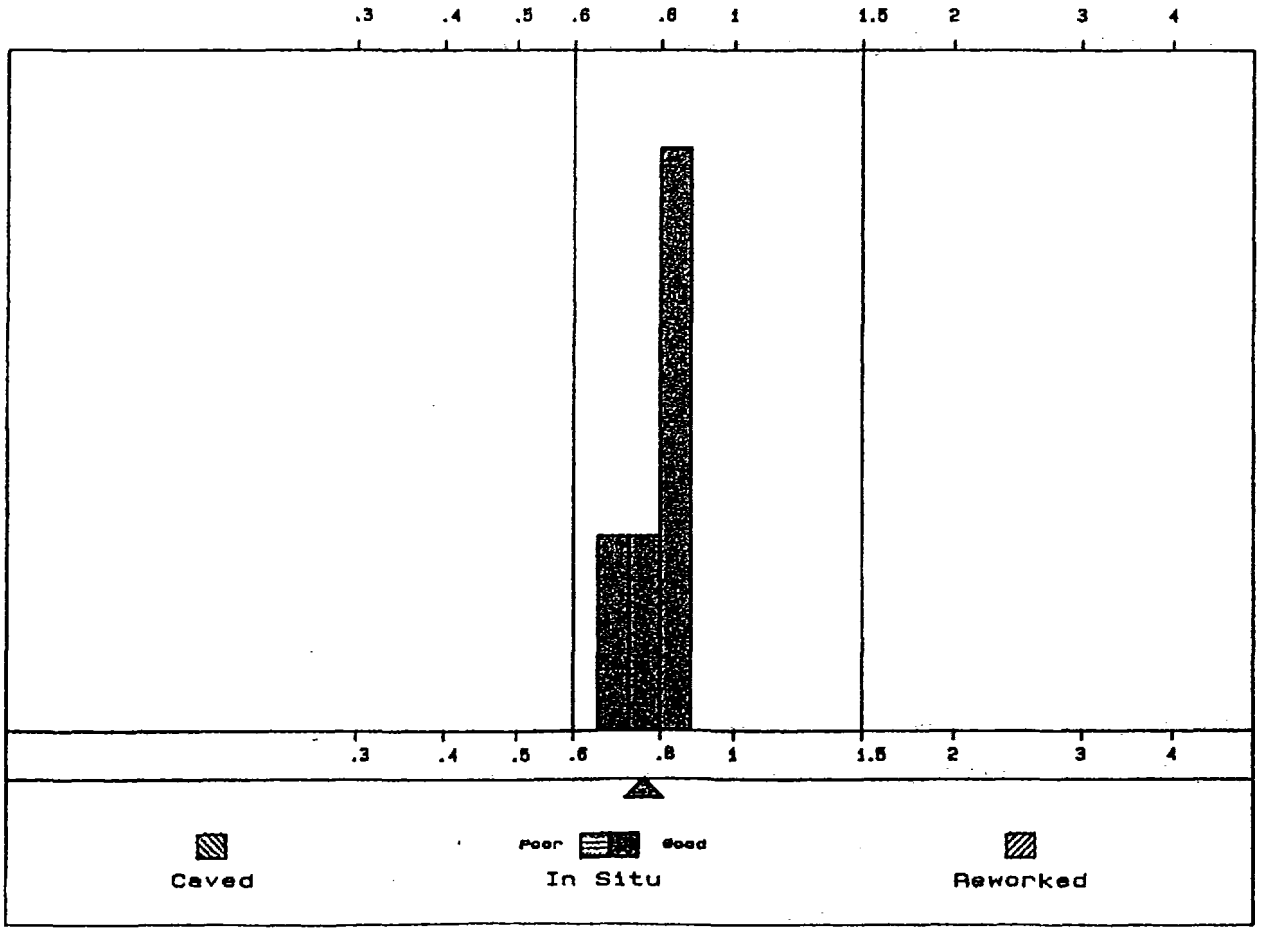


BUJAK DAVIES GROUP.: VITRINITE Inskin Well

SAMPLE : 2370f

Population	Mean	Standard Deviation
In Situ	0.74	0.06
Caved	-	-
Reworked	-	-
Total	0.74	0.06

Total measurements this sample : 5

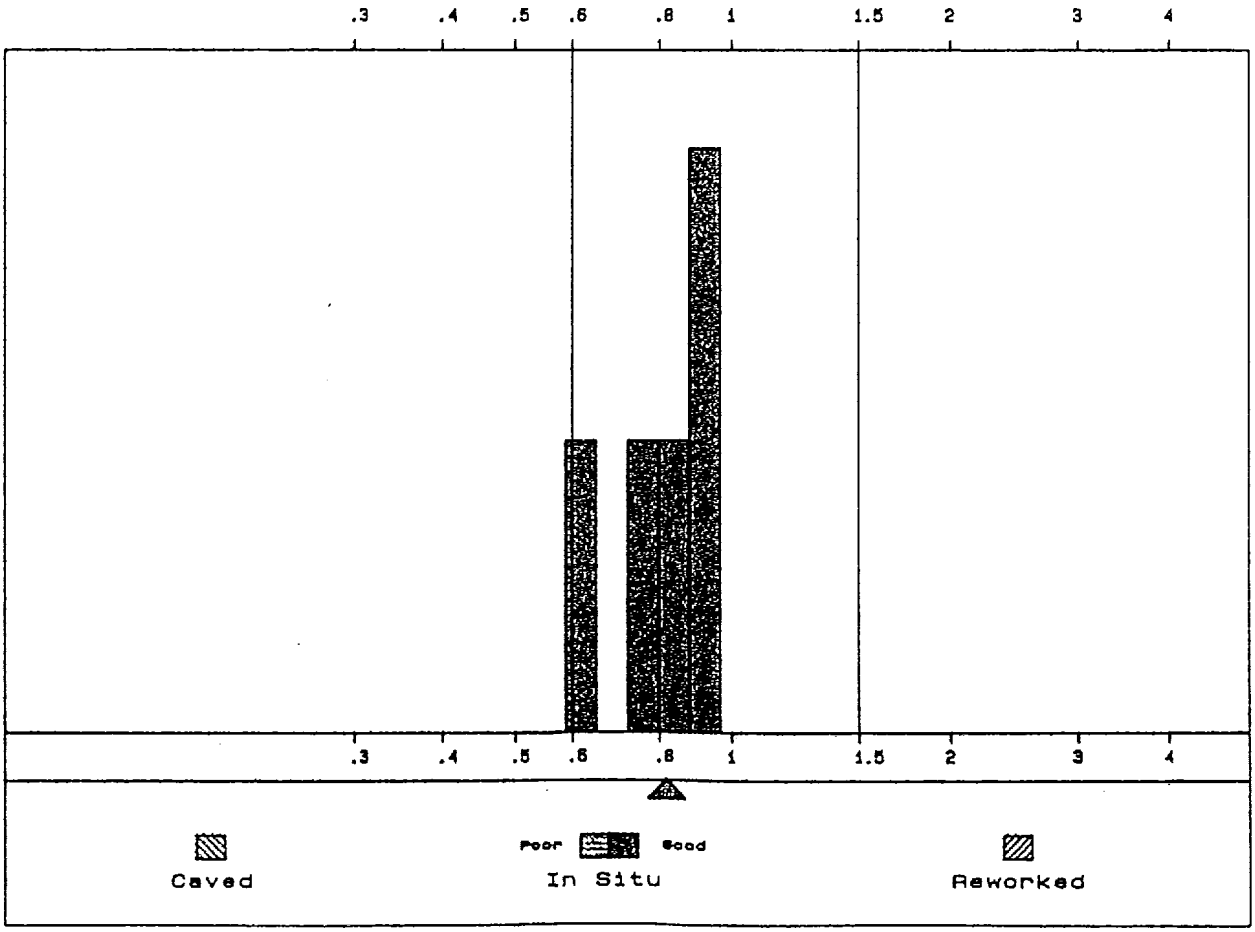


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 3040f

Population	Mean	Standard Deviation
In Situ	0.80	0.10
Caved	-	-
Reworked	-	-
Total	0.80	0.10

Total measurements this sample : 5

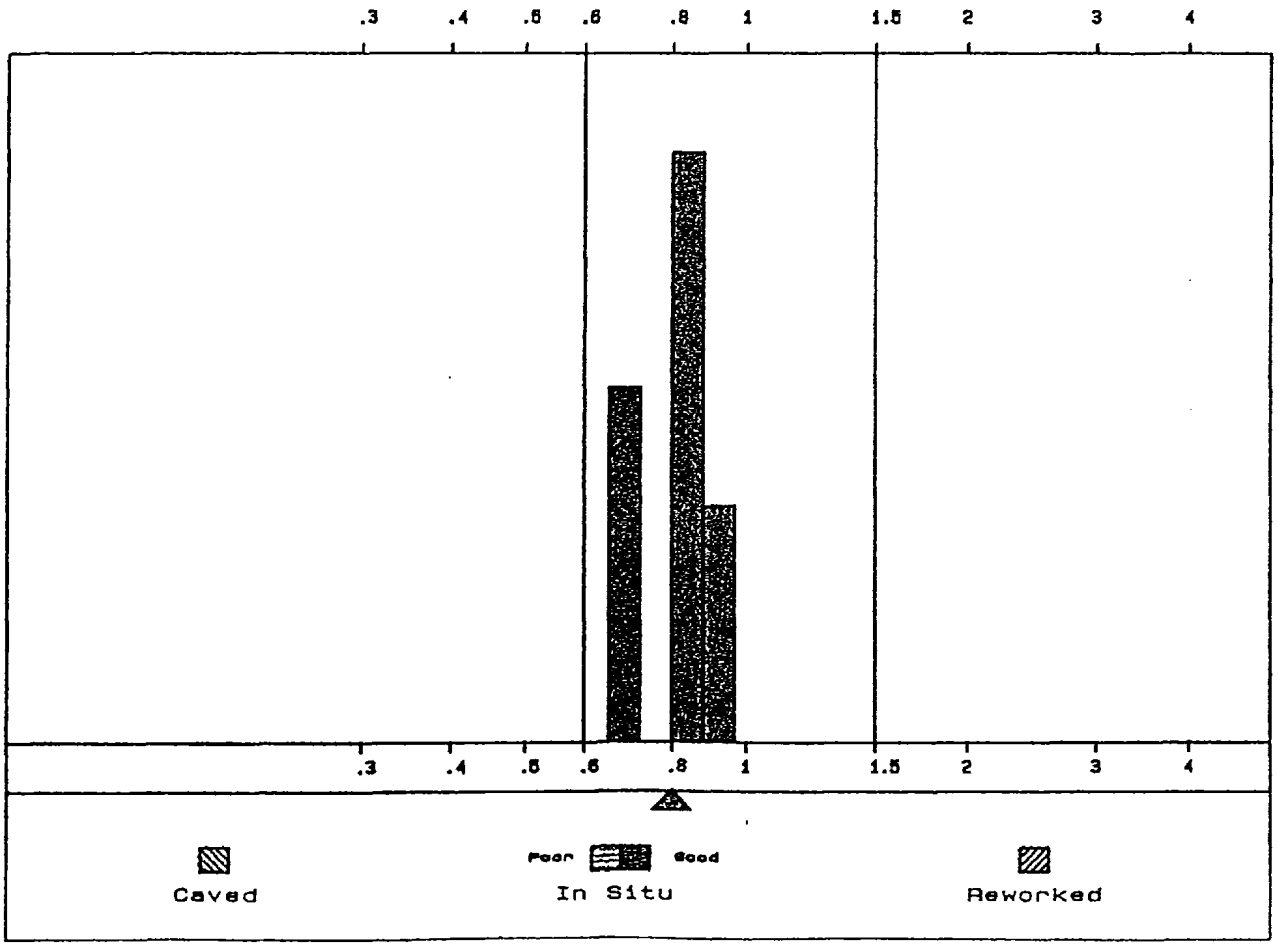


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 3400f

Population	Mean	Standard Deviation
In Situ	0.78	0.09
Caved	-	-
Reworked	-	-
Total	0.78	0.09

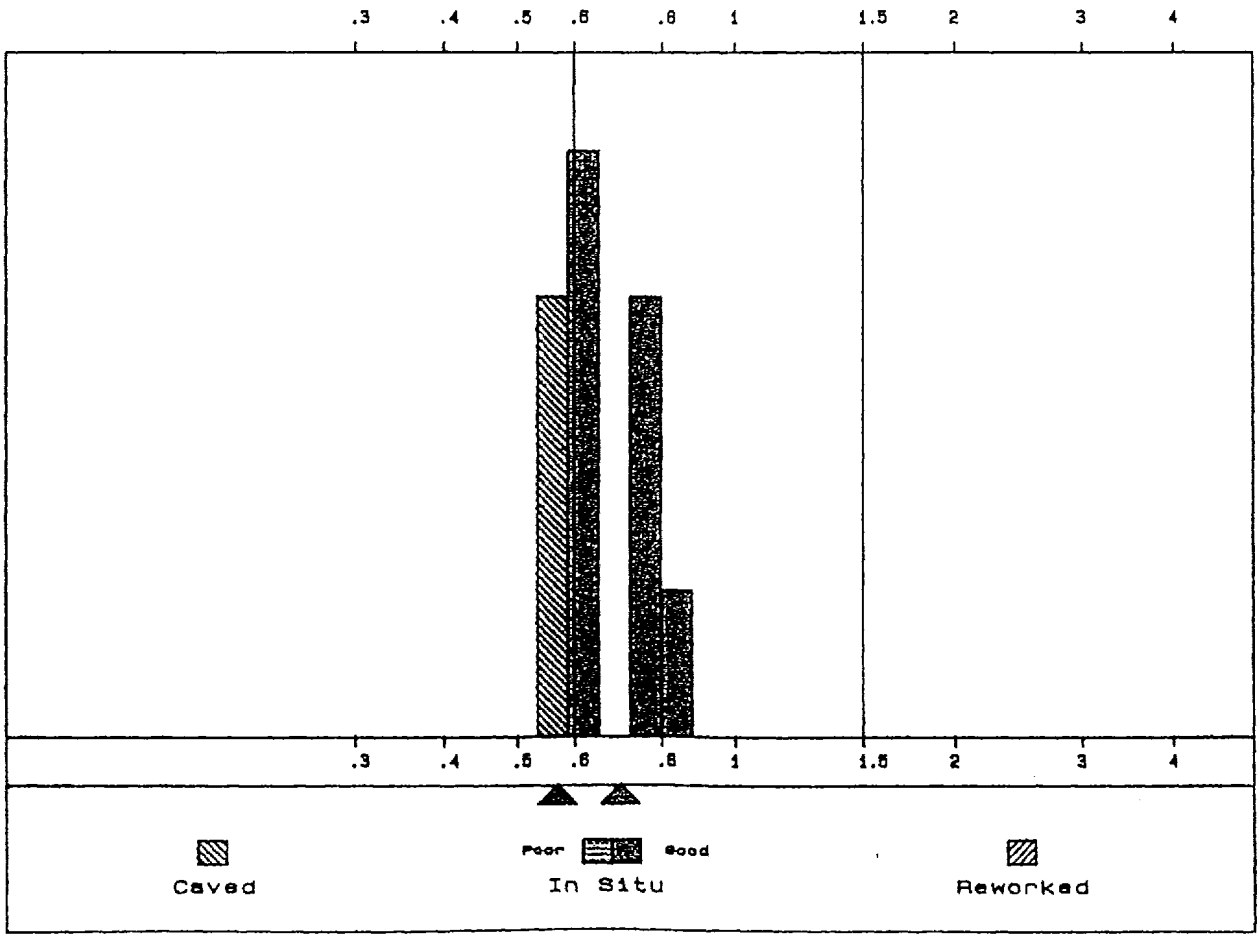
Total measurements this sample : 10



SAMPLE : 4200f

Population	Mean	Standard Deviation
In Situ	0.69	0.09
Caved	0.56	0.02
Reworked	-	-
Total	0.65	0.09

Total measurements this sample : 11

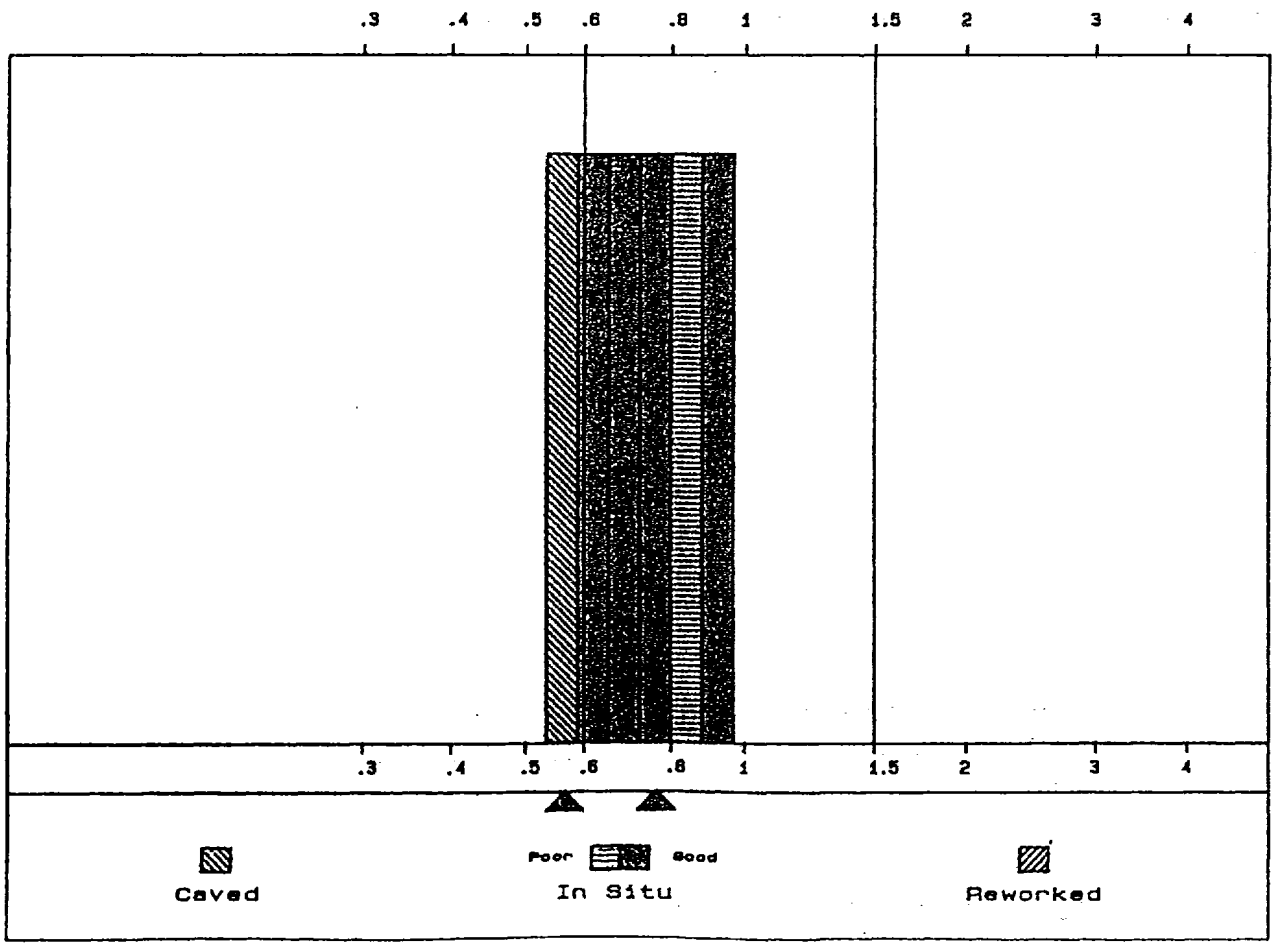


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 4370f

Population	Mean	Standard Deviation
In Situ	0.75	0.08
Caved	0.56	-
Reworked	-	-
Total	0.71	0.11

Total measurements this sample : 6

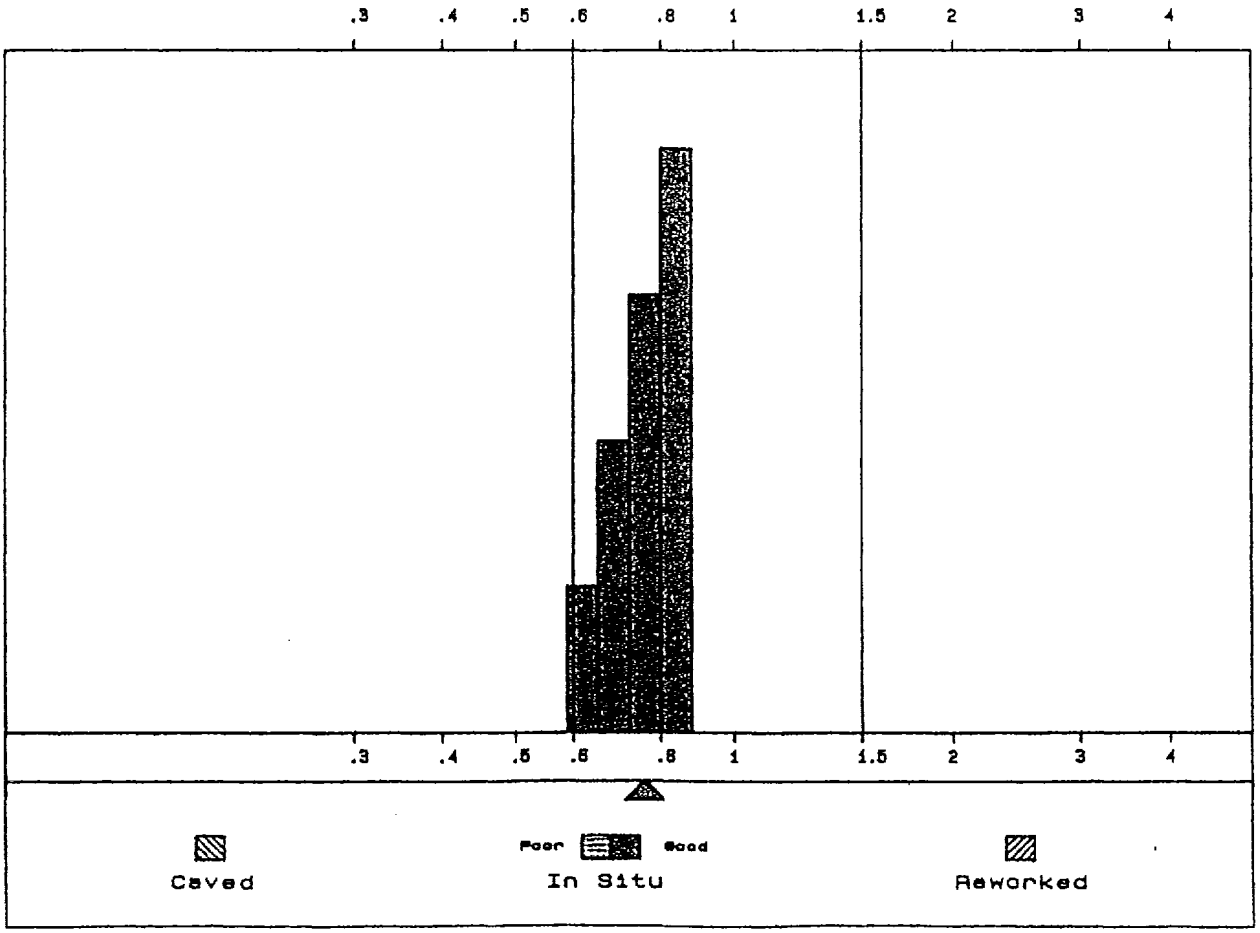


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 5000f

Population	Mean	Standard Deviation
In Situ	0.74	0.08
Caved	-	-
Reworked	-	-
Total	0.74	0.08

Total measurements this sample : 10

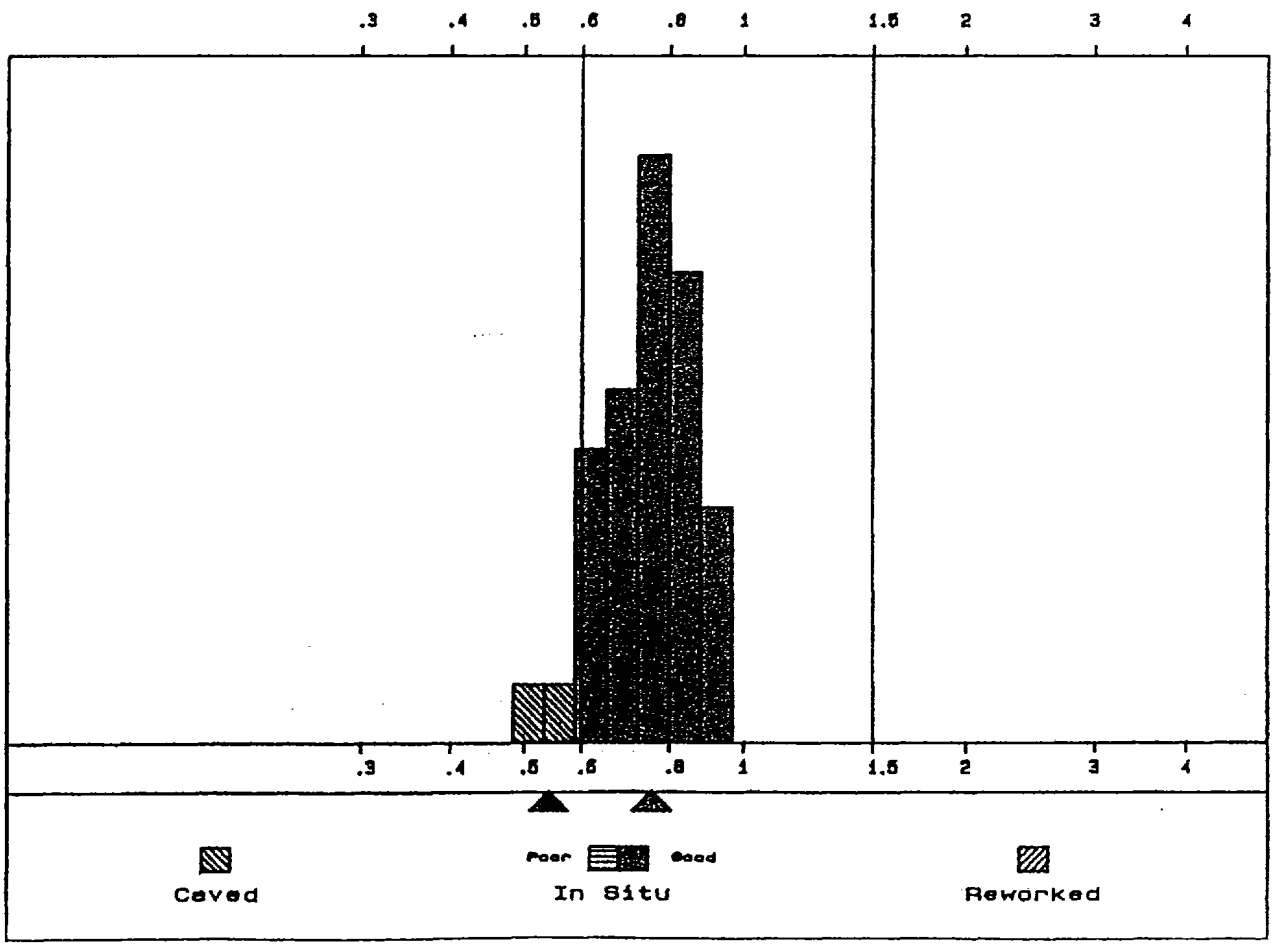


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 5440f

Population	Mean	Standard Deviation
In Situ	0.74	0.08
Caved	0.64	0.02
Reworked	-	-
Total	0.73	0.09

Total measurements this sample : 35

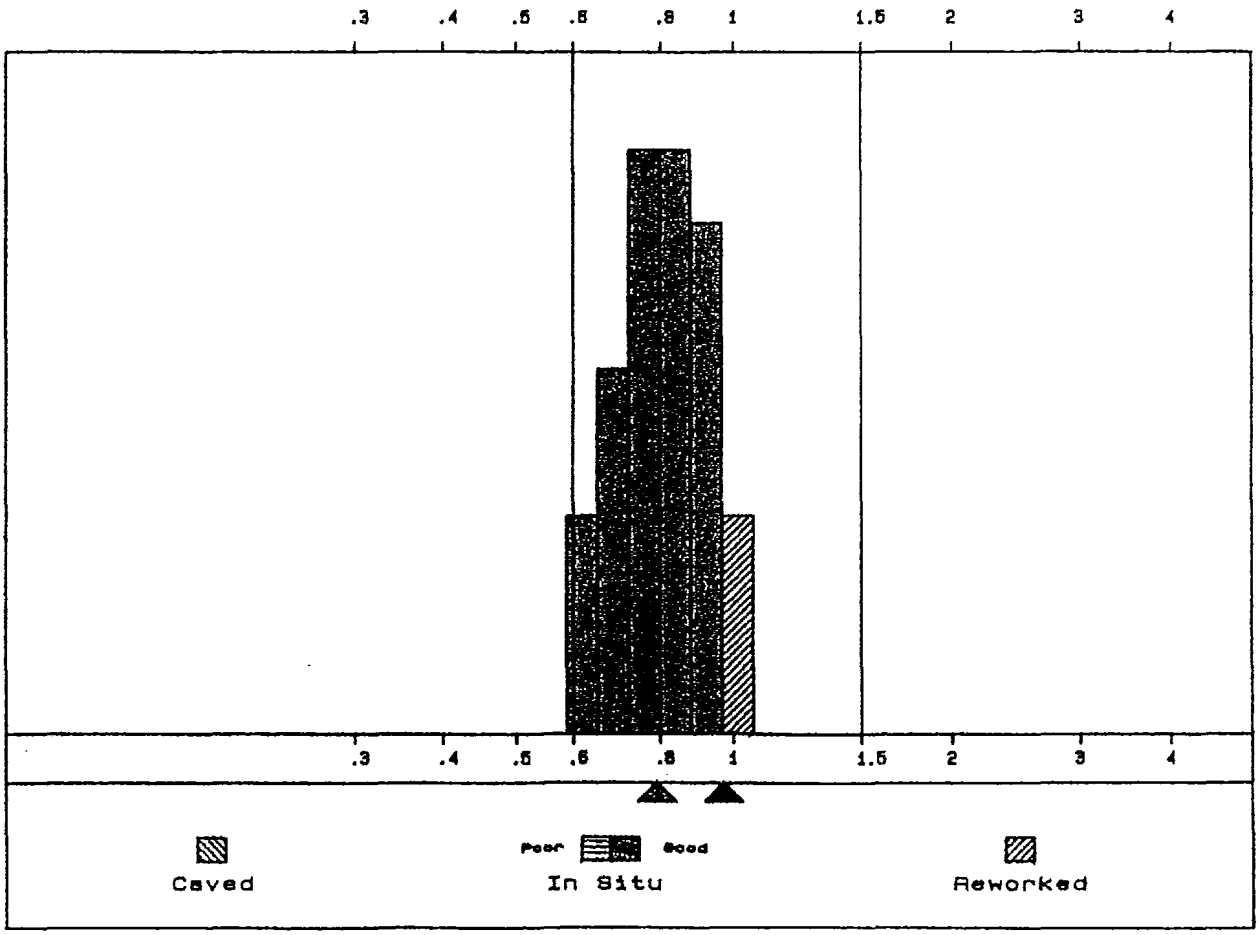


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 5970f

Population	Mean	Standard Deviation
In Situ	0.77	0.09
Caved	-	-
Reworked	0.95	0.00
Total	0.79	0.10

Total measurements this sample : 34

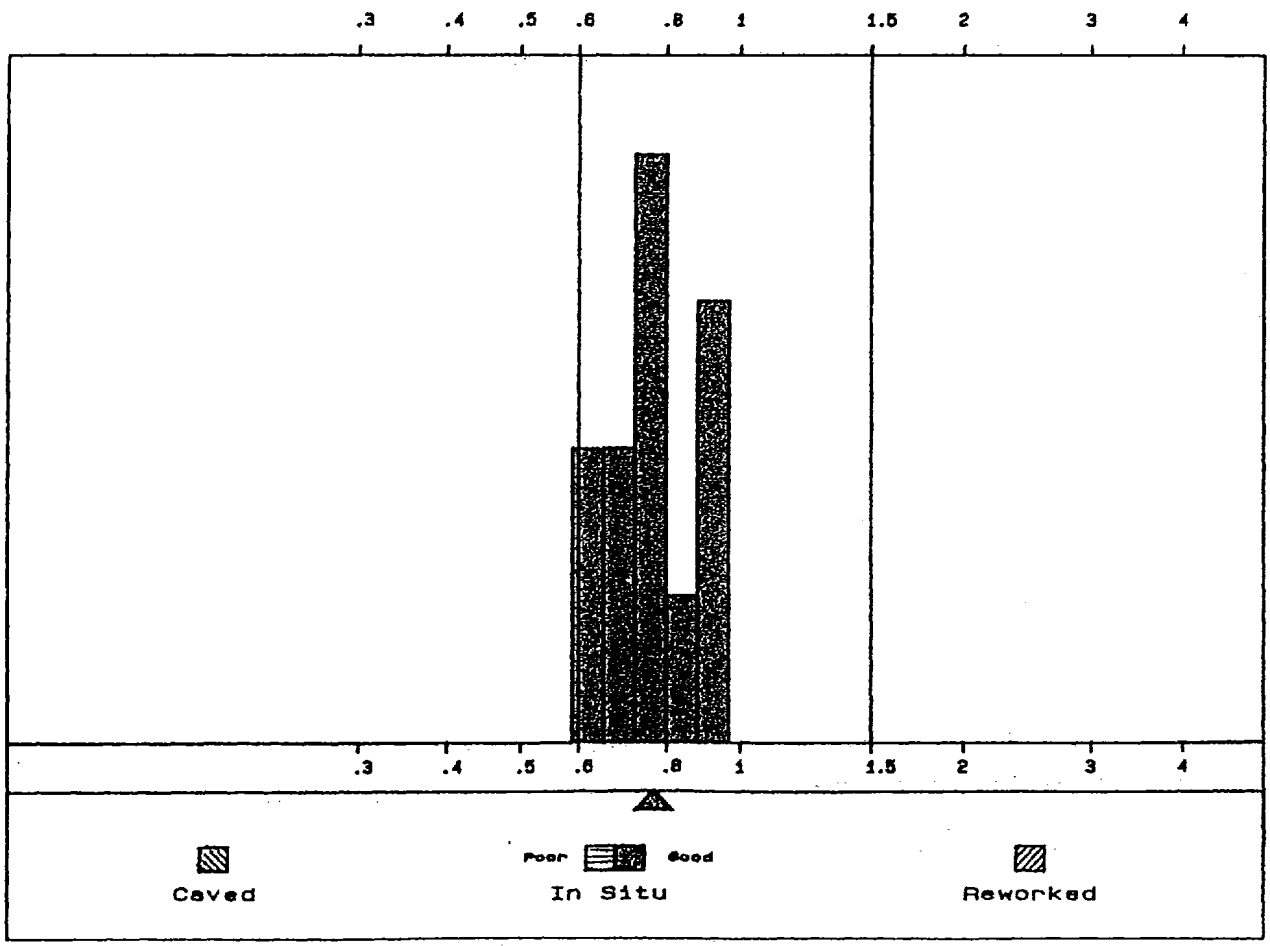


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 6540f

Population	Mean	Standard Deviation
In Situ	0.75	0.10
Caved	-	-
Reworked	-	-
Total	0.75	0.10

Total measurements this sample : 12

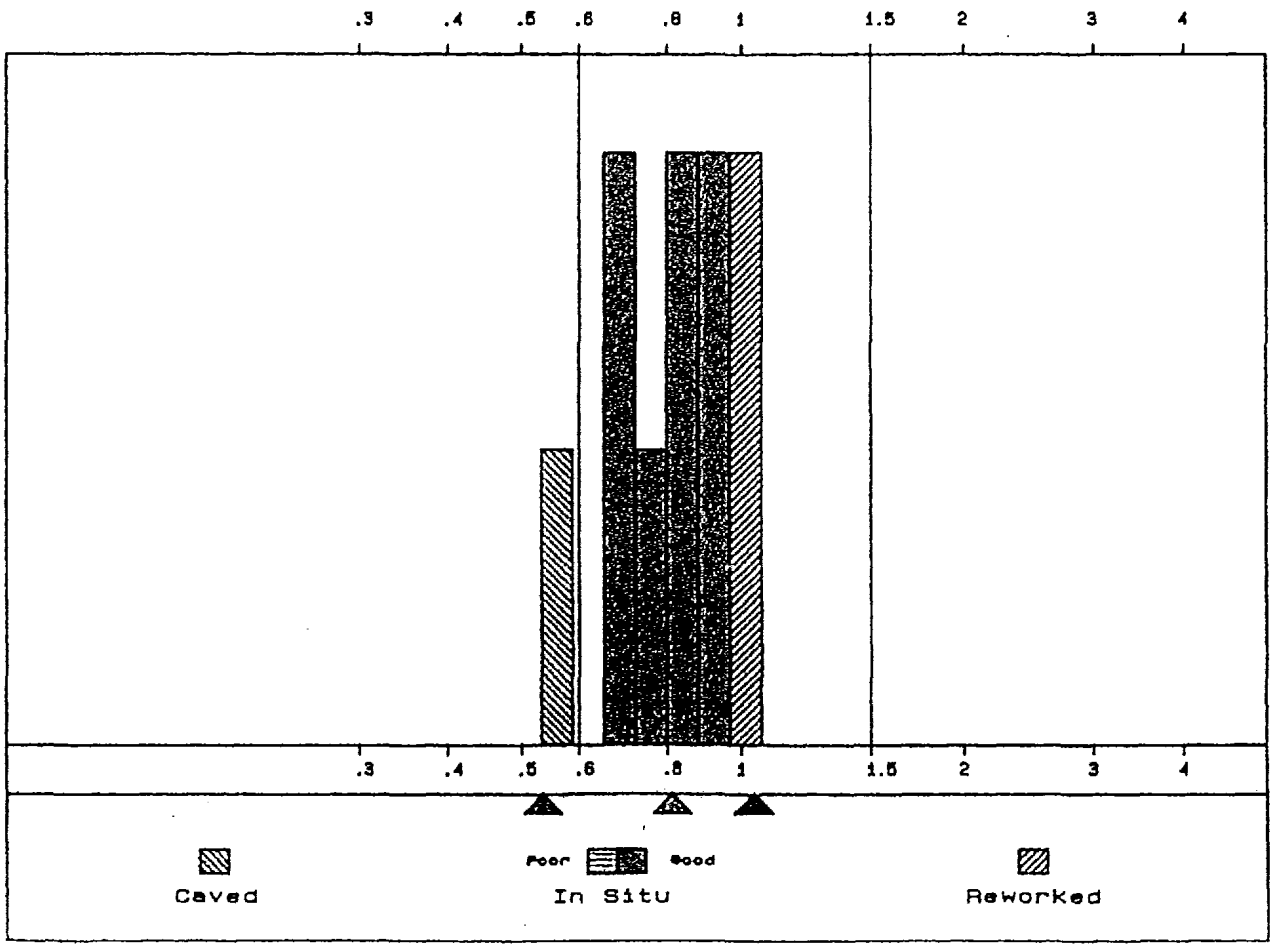


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 7120f

Population	Mean	Standard Deviation
In Situ	0.79	0.10
Caved	0.53	-
Reworked	1.02	0.00
Total	0.81	0.16

Total measurements this sample : 10

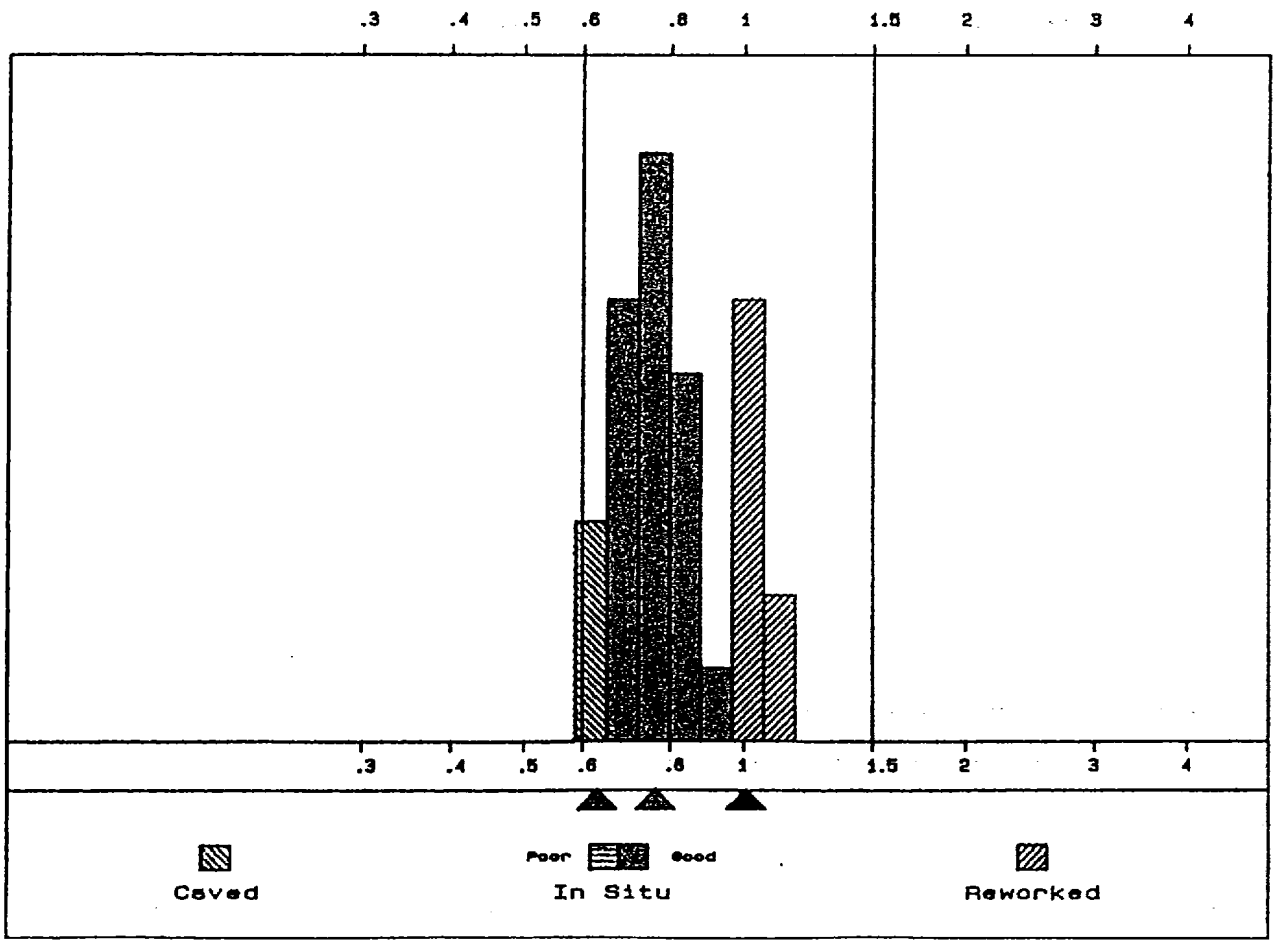


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 7440f

Population	Mean	Standard Deviation
In Situ	0.76	0.06
Caved	0.62	0.02
Reworked	0.99	0.04
Total	0.80	0.13

Total measurements this sample : 31

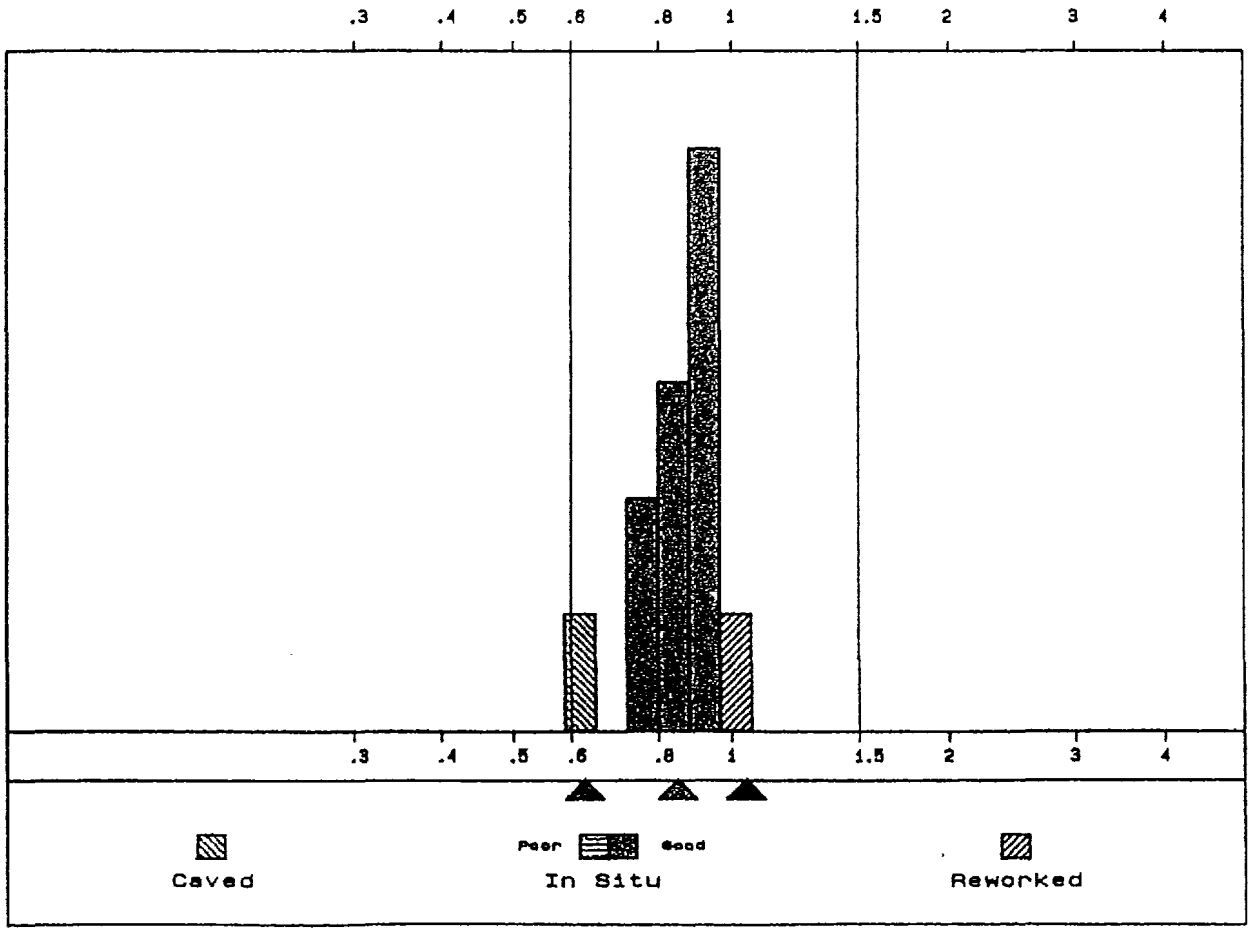


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 7970f

Population	Mean	Standard Deviation
In Situ	0.83	0.05
Caved	0.62	-
Reworked	1.03	-
Total	0.83	0.10

Total measurements this sample : 12

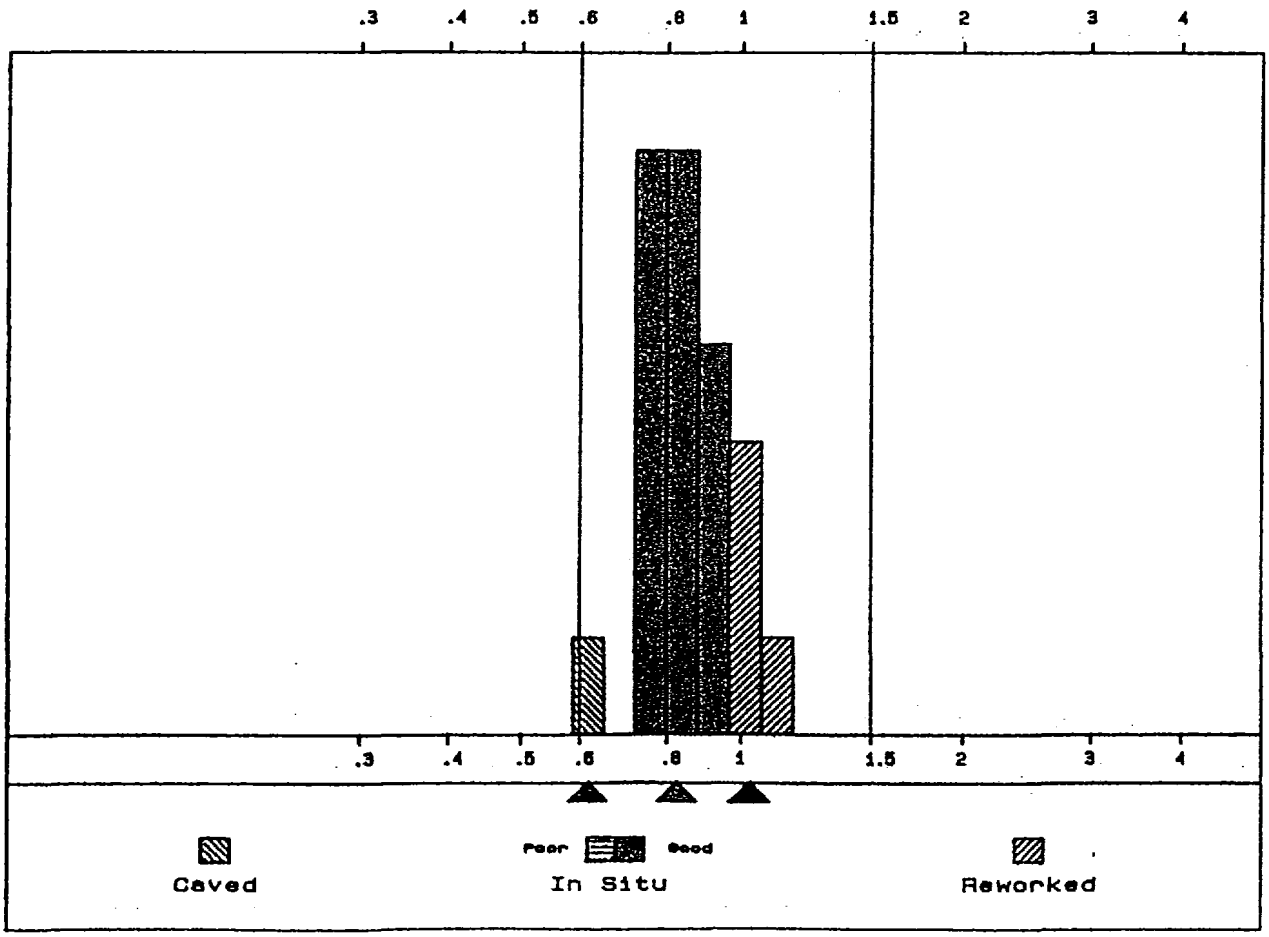


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 8370f

Population	Mean	Standard Deviation
In Situ	0.61	0.07
Caved	0.61	-
Reworked	1.01	0.05
Total	0.84	0.11

Total measurements this sample : 21

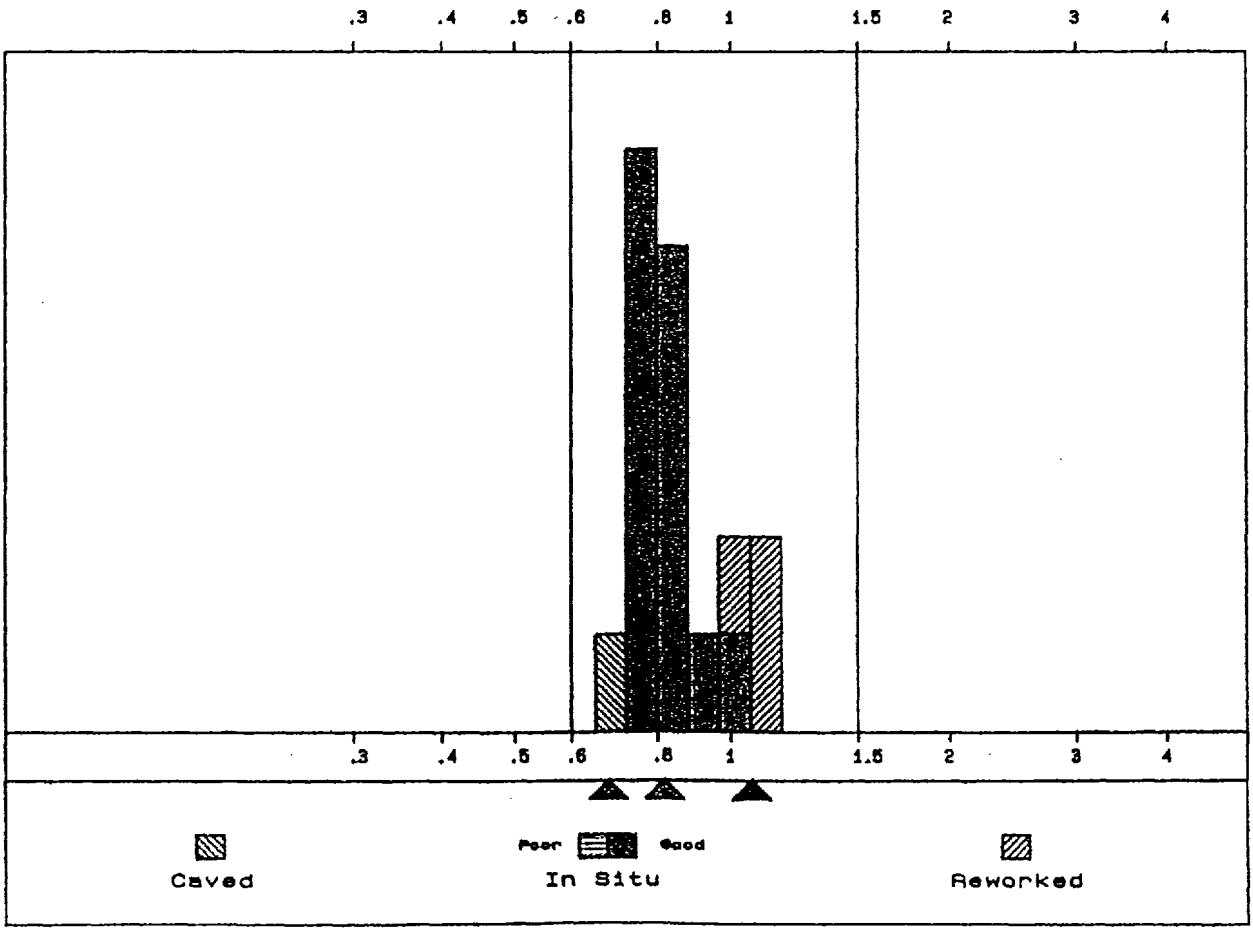


BUJAK DAVIES GROUP.: VITRINITE Inskin Well

SAMPLE : 9000f

Population	Mean	Standard Deviation
In Situ	0.80	0.07
Caved	0.67	-
Reworked	1.05	0.08
Total	0.84	0.12

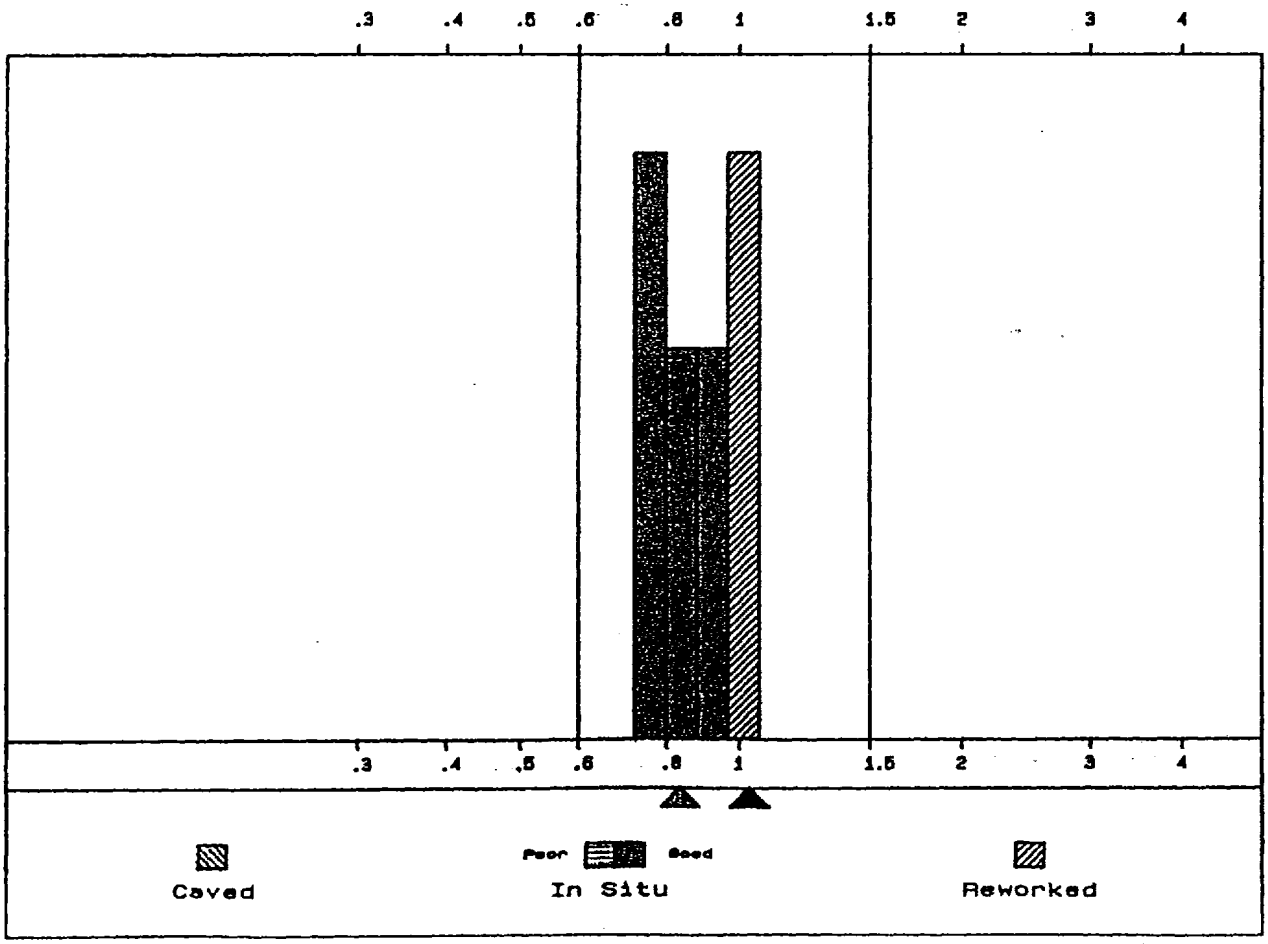
Total measurements this sample : 17



SAMPLE : 9530f

Population	Mean	Standard Deviation
In Situ	0.82	0.07
Caved	-	-
Reworked	1.01	0.02
Total	0.88	0.11

Total measurements this sample : 10

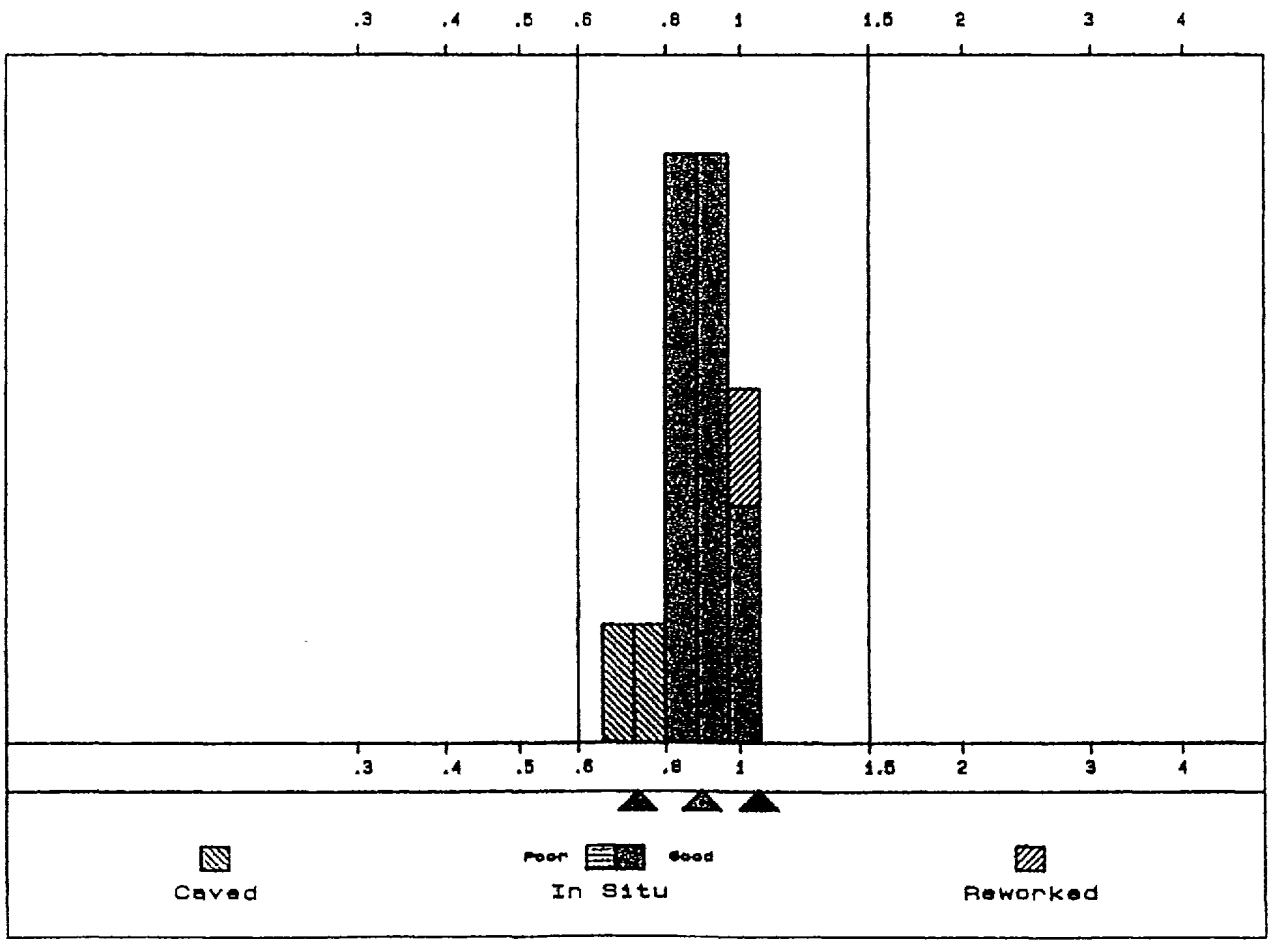


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 10090f

Population	Mean	Standard Deviation
In Situ	0.87	0.08
Caved	0.72	0.02
Reworked	1.04	-
Total	0.86	0.09

Total measurements this sample : 15

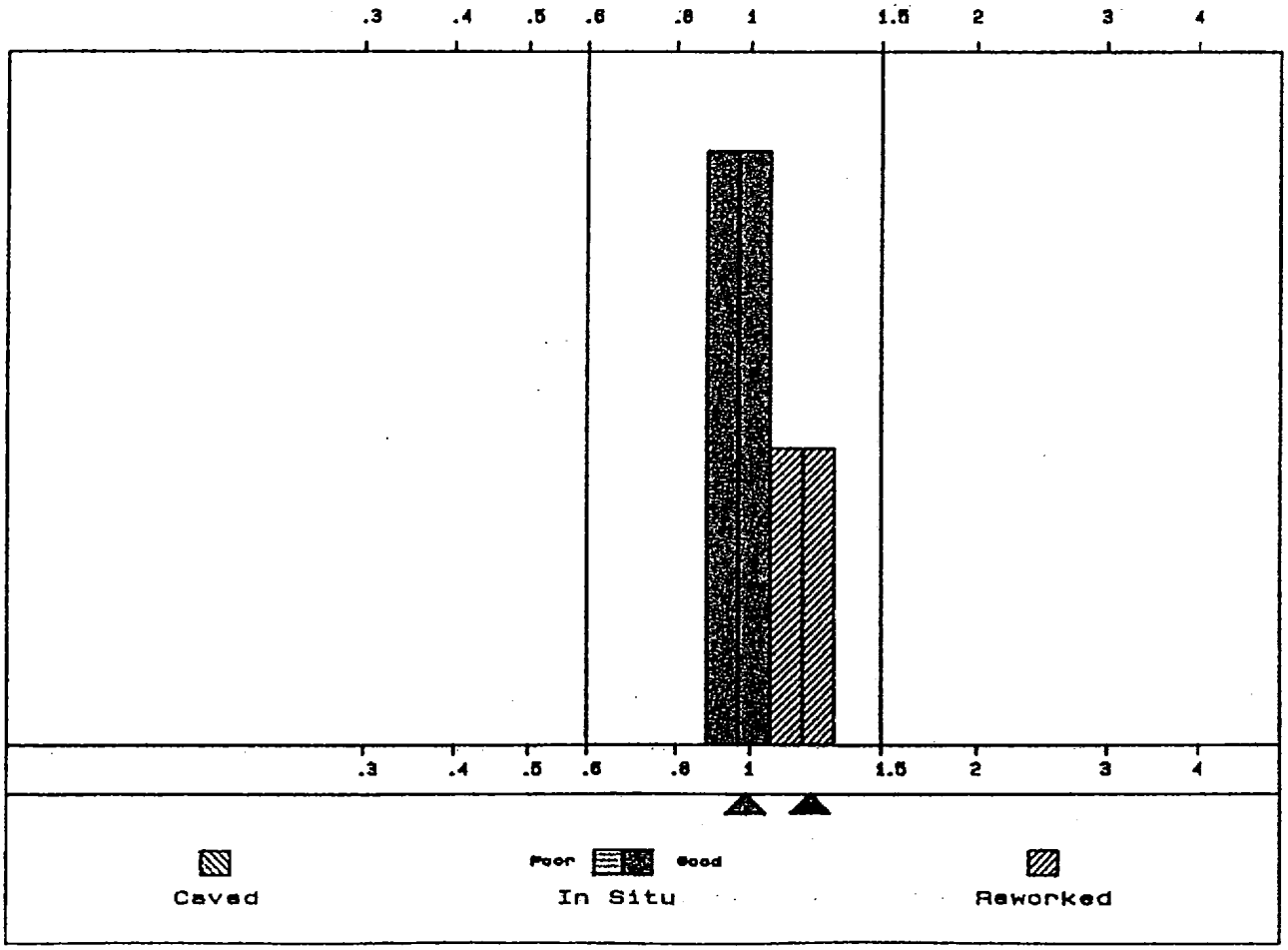


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 10370f

Population	Mean	Standard Deviation
In Situ	0.97	0.06
Caved	-	-
Reworked	1.19	0.05
Total	1.04	0.12

Total measurements this sample : 6

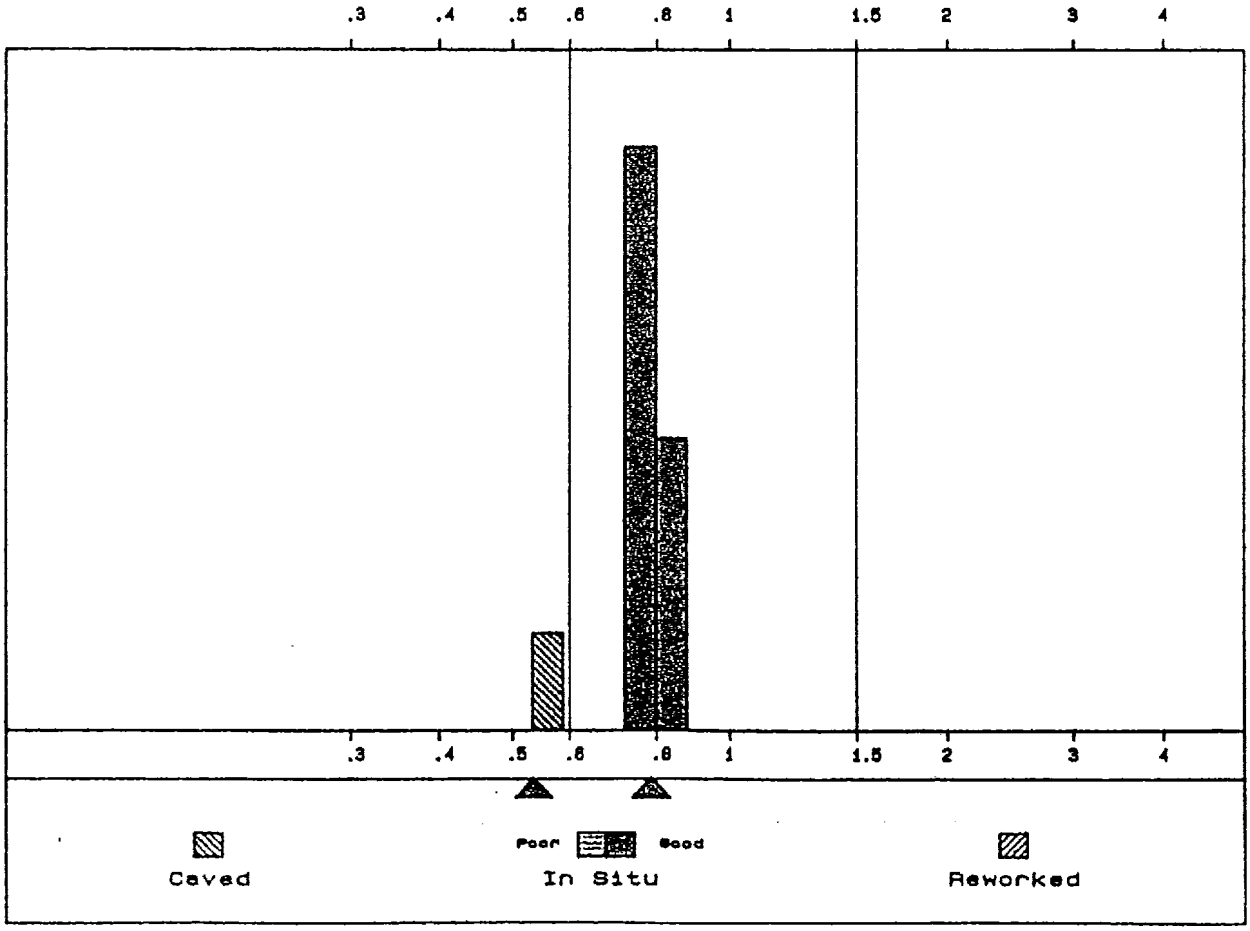


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 10790f

Population	Mean	Standard Deviation
In Situ	0.77	0.05
Caved	0.53	-
Reworked	-	-
Total	0.75	0.09

Total measurements this sample : 10

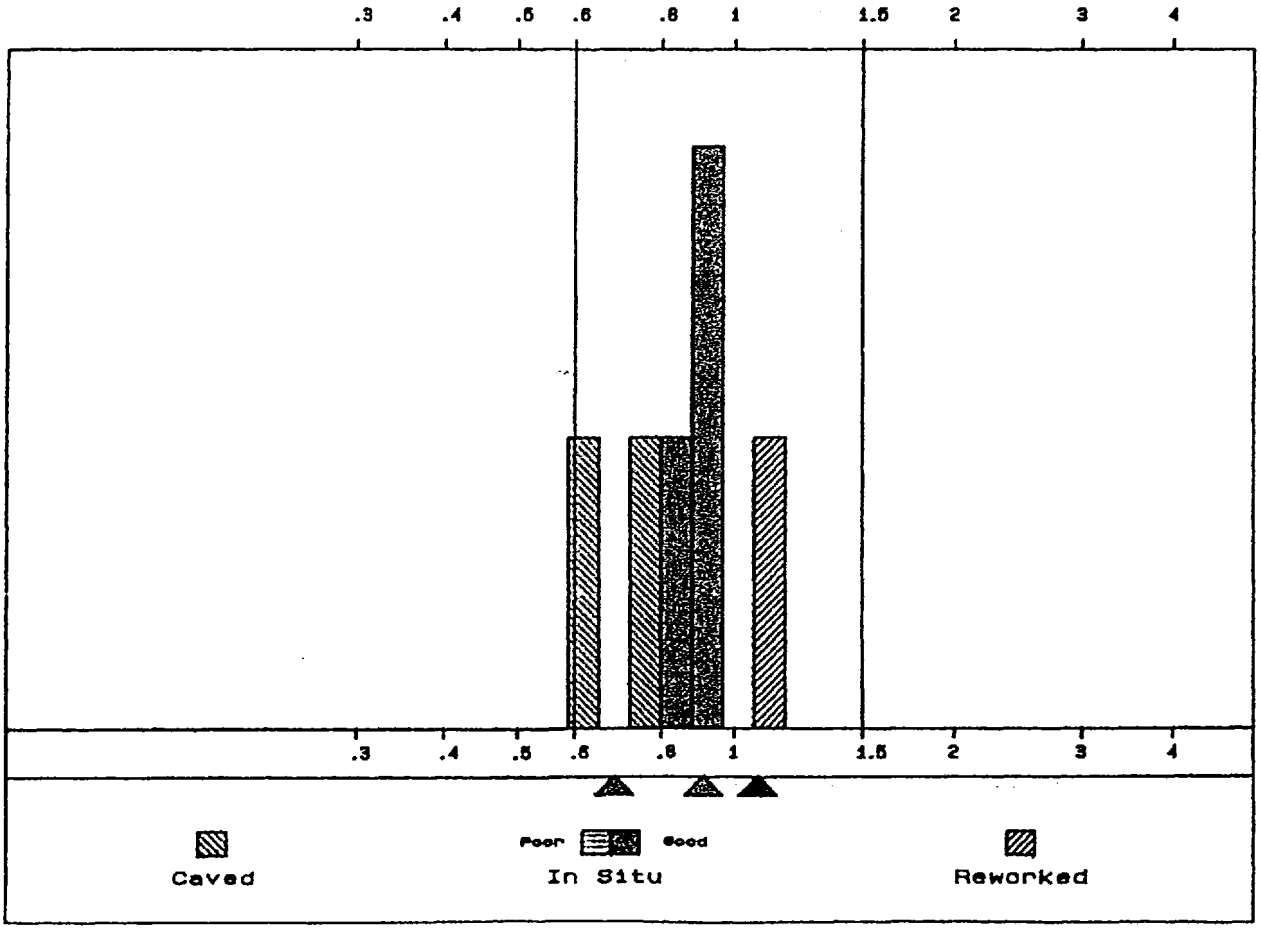


BUJAK DAVIES GROUP : VITRINITE Inskin Well

SAMPLE : 11110f

Population	Mean	Standard Deviation
In Situ	0.89	0.08
Caved	0.68	0.05
Reworked	1.06	-
Total	0.85	0.15

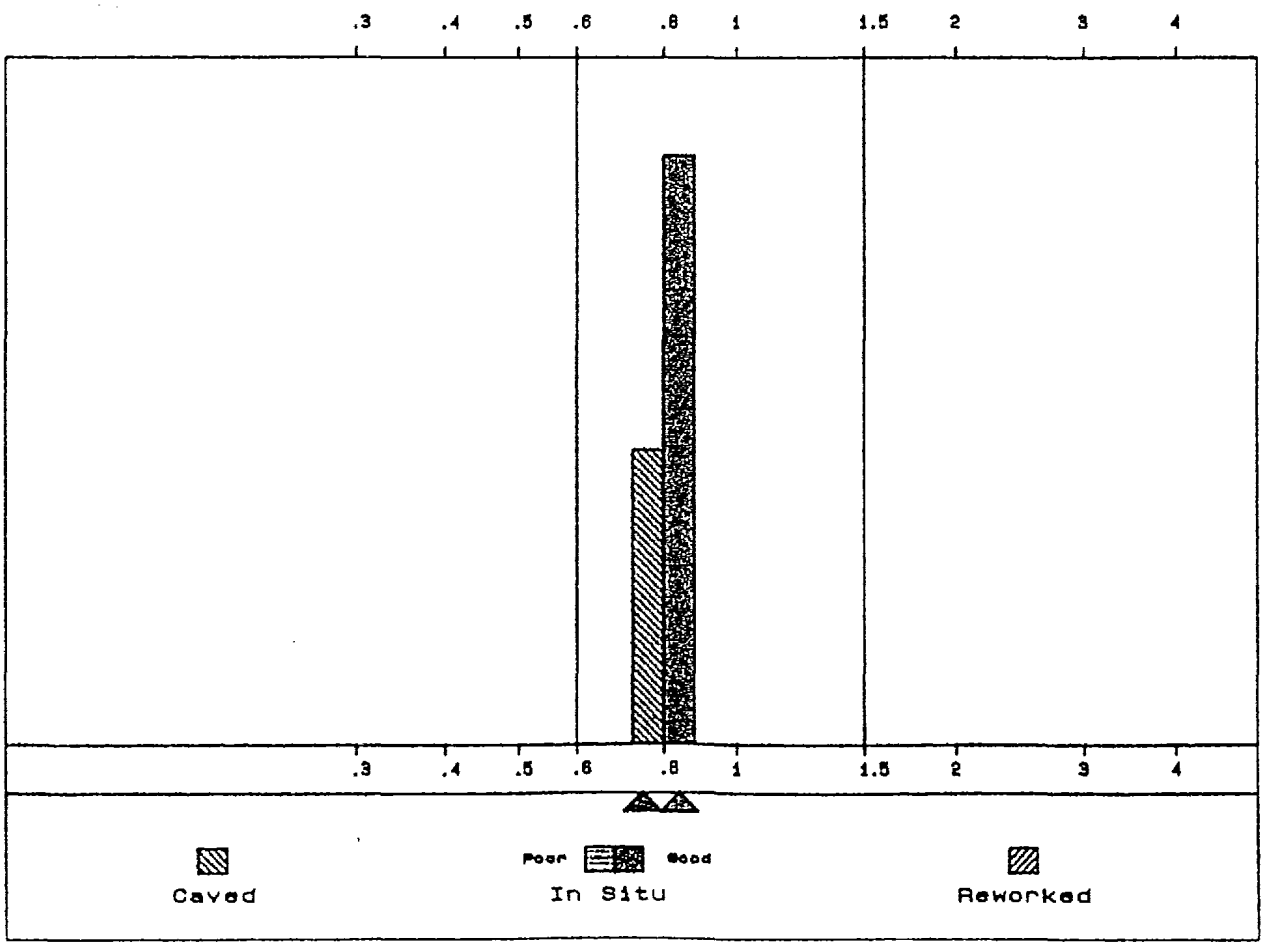
Total measurements this sample : 6

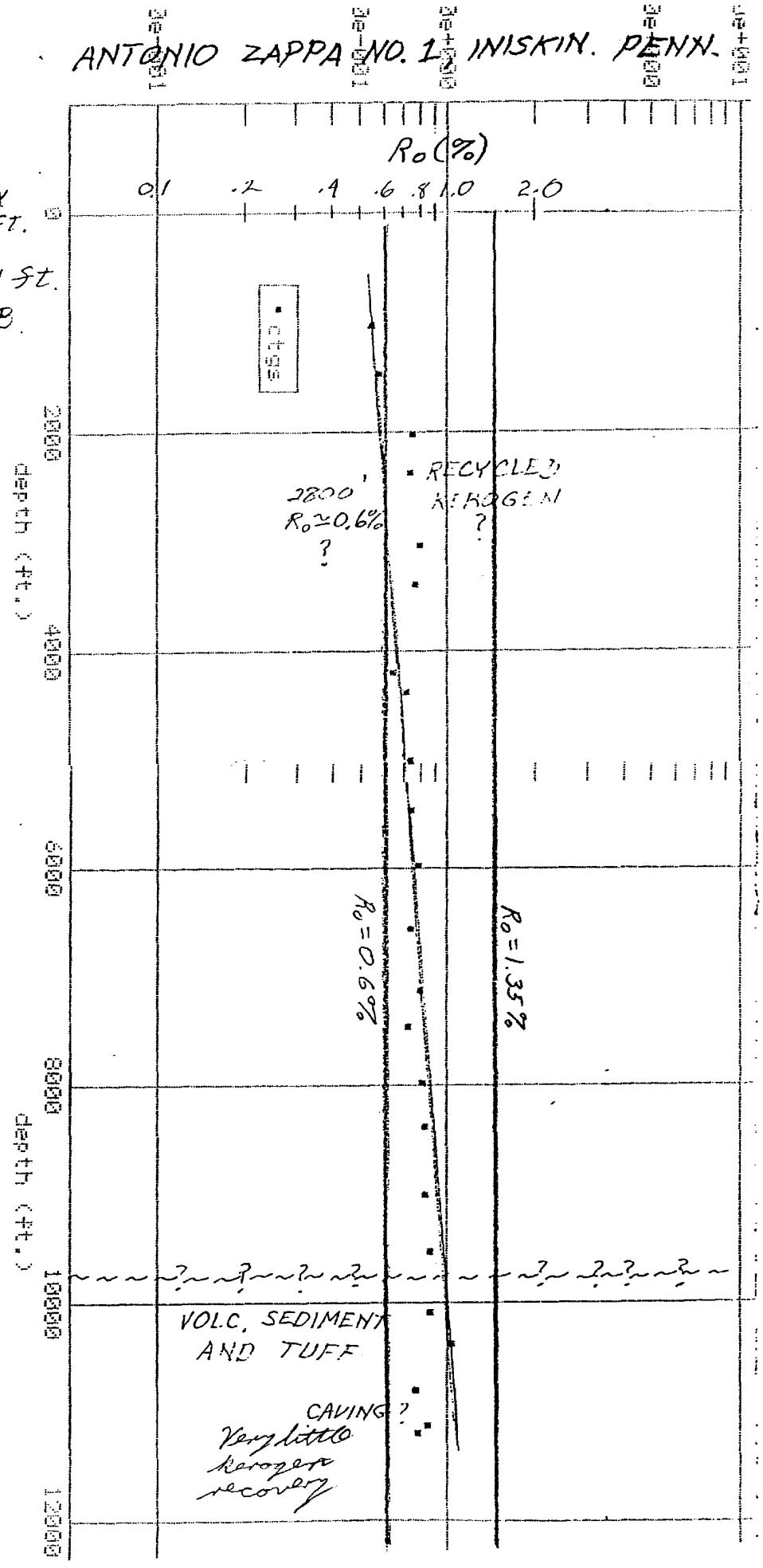


SAMPLE : 11190f

Population	Mean	Standard Deviation
In Situ	0.82	0.03
Caved	0.73	-
Reworked	-	-
Total	0.79	0.06

Total measurements this sample : 3




ANTONIO ZAPPA NO. 1 INISKIN. PENN.
Ro (%)
0.1
.2
.4
.6
.8
1.0
2.0
KB: APPROX +330 ft.
TD: 11,231 ft. below KB.
Vitrinite Reflectance measured by Bujak Davies Group of Calgary, Alberta.
MMS (Jake Flett) interpretation SR
2800'
Ro ≈ 0.6% ?
RECYCLED? KEROGEN ?
Ro = 0.69%
Ro = 1.35%
VOLC. SEDIMENT AND TUFF
CAVING?
Very little kerogen recovery
Depth (ft.)
0
2000
4000
6000
8000
10000
12000